SIGNAL(tm):

Propagation model: Hata-extended/E-P diff
Time: 99.00% Loc: 97.00% Margin: 11.5 dB
Climate: Continental Temperate
Gndcvr: USGS-EDX database
Atm. factor: None
K Factor: 1.333
RX Antenna: Omni
Height: 3.3 feet AGL Gain: 6.0 dBd

Received power (at remote)

> -108.0 dBmW
-118.0 to -108.0 dBmW
< -118.0 dBmW

Minimum threshold level: -150.0 dBmW

Site	Ant Elv AMSL (feet)	ERPd (dBW)	Ant. Type /Orient.	Coordinates
MTL *	5144.2	18.34	OM-V	N 34 16 7.00
grp: 2	1500.0000 MHz			W118 14 12.00

MILES

10 0 10 20 30

LOS ANGELES SIMULATION

1500 MHz

18 September 1996 MO Talk-Out

EXHIBIT-8

EXHIBIT-9

Public Safety Wireless Communications User Traffic Profiles and Grade-Of-Service Recommendations

13 March 1996
Revision-0

Submitted to:

PUBLIC SAFETY WIRELESS ADVISORY COMMITTEE (PSWAC)

Prepared by:

Dr. Gregory M. Stone

ABSTRACT

This paper presents a structured approach and methodology recommended for the modeling and simulations of conventional (including those with composite control) and trounced public safety wireless communications systems based upon traffic engineering principles. These recommendations include: the provision of standard public safety user traffic profiles; adoption of the Poisson and Erlang-C traffic and delay equations; establishment of a recommended grade of service, priority and response times for public safety wireless communications.

traffic profiles. When data services that involve large file sizes are attempted, both the information transport and processing and turnaround times tend to become significant. If a system is sized to accommodate a certain quantity of five second messages and the traffic usage is characterized by transmissions of 30-60 seconds or more, the overall performance of the system quickly becomes degraded. Likewise, operational users of the systems are not accustomed to long transmission or turnaround delays; in fact, public safety operations are generally intolerant of such delays.

SPECIAL data will not be able to be accommodated on a wholesale basis until its transfer times are comparable to query type data in most systems or in a worst case, comparable to the typical voice transmission length in those lightly loaded systems. This is an important point that is often overlooked in the current euphoria over technology. Of course, should dramatic advancements in compression techniques make SPECIAL data more manageable, current and emerging state-of-common usage systems can then be effectively exploited for this type of teleservice.

Given the operational requirements of the vast majority of public safety user agencies, we assert the primary usages of current public safety systems will be to transport voice, status/message and file query data. In this regard the metrics presented have been further refined to focus on these primary services.

In an attempt to understand the broad applicability and utility of this profile, we have created sub-categories such as voice and data for hazardous materials and for EMS communications. Also identified in a separate sub-category is a very common communications mode that is often overlooked: car-to-car or unit-to-unit traffic. Many federal, state, and local law enforcement and Public Safety operations including Fire Ground, etc. make extensive use of this tactical unit-to-unit communications modality.

Heeding the advice of many commentators on our previous traffic profile work, we have avoided the double counting aspect of this tactical unit-to-unit operational modality. This issue arose as most of the unit-to-unit traffic is typically "off-infrastructure" on a simplex channel not going through a mobile relay. Occasional unit-to-unit communications, which use a mobile relay, can be accommodated through the remaining categories.

It is our intent to present a universal traffic profile and metric amalgamation. From a user needs and requirements point-of-view, we believe that the traffic profile should be broadly applicable to both conventional and trunked environments and scaleable to address small and large system usages.

In this regard, we are unable to subscribe to the notion that specifics given for control traffic loading and usage are user requirements or are representative of a user offered load. We therefore do not include values which are illustrative and applicable to a particular trunking technology implementation solution. Thus, how much trunking control load is imposed in a particular system implementation to service the user profile we have advanced here-in is NOT addressed. In this regard, it is our position that control channel load is the effect caused by a certain user loading and will vary depending upon the specific technical solution applied.

Likewise, we have not included any references to implementation solutions such as transmission or message trunking or any reference to fringe area retransmission or retry factors. Nor have we included any multi-site load factors as they appear to assume that the average user may be generalized to a multi-site system. In addition, the selection of multi-site factor(s) is technology solution dependent and this is not representative of a user defined load.

Furthermore, the fact that we have presented a unified metric means that we are generalizing that all Public Safety users employ voice, data and status. This assertion is somewhat is problematic to us as our experience has shown that there is a very wide diversity in data and status usage amongst public safety users.

We have therefore chosen to present the offered data in both aggregate total offered load and in decomposed format segregating the voice, data and status loading. In the future, we believe that most but not all Public Safety users will employ some form of data, be it status and or messaging. Thus for simulation purposes we strongly recommend employing the unified aggregate load figures for projected future usage.

The traffic profiles provided represent discrete and composite values for both current and projected future usages for a hypothetical Law Enforcement/Public Safety organization employing both digital voice and digital multimedia services. The current traffic profile was developed from an aggregation of federal, state and local law enforcement data. The future profile was based upon the current aggregation along with projections of future data usage. The assumptions and predicates for these profiles are declared. These composite traffic profiles are presented to serve as a comparative baseline to assess the performance of advanced digital trunked systems in law enforcement/public safety usage. This composite traffic profile is not meant to serve as an absolute design criteria for any specific user agency or activity.

We acknowledge the need however, for a standard traffic profile. The traffic profiles offered in this document may be used for system modeling, simulation and design purposes for both current and projected usages. However, it is incumbent upon all designers and system operators to regularly collect and analyze the actual usage statistics of their respective systems. Certain user agencies may find our profiles are too conservative, while others may find we have underestimated the real load. Over time, on a continual and regular basis, the specific system performance must be evaluated. If excessive blocking and access delays occur, steps must be taken to correct for these occurrences. Likewise, if the grade-of-service is significantly better than the design objective, additional officer traffic may likely be accommodated.

We advocate a technically sound common sense approach to system optimization be institutionalized in both trunked and conventional environments. Recognizing that past statistical trends may be useful for certain forecasting where the operational imperatives remain constant. Unfortunately, natural and manmade disasters will impose severe demands on any conventional or trunked system in a fashion that is radically different from "routine" emergency peak loading. Proactive planning, and not our traffic profiles is needed to assure system availability in times of catastrophic events.

TRANSACTION CLASSIFICATION DEFINITIONS:

The traffic profiles tables provided in the attachments tabulate the types of transactions supported by public safety wireless communications systems. General categories such as Teleservice, are employed to define the types of information being transported. These transactions are grouped into the following three categories:

Digital Voice: Those actions that relate to the use of system resources needed to handle calls related to information transfer via voice and contribute to the aggregate communications system channel information transfer rate and load. Voice traffic is generally passed via a working channel that is either dedicated for voice transport or is shared with supervisory and/or status/message data.

Data: Those actions that relate to the use of system resources needed to handle calls related to information transfer via non-voice means and contribute to the aggregate communications system channel information transfer rate and load. Data traffic is generally passed via a working channel that is either dedicated for message data transport or is shared with supervisory data and/or voice traffic. Data traffic may be transported through both circuit switched and packet mechanisms. It is assumed for this analysis that all data are packetized, confirmed delivery except for slow scan imagery, which is presumed to be circuit switched. SPECIAL DATA has been segregated from the projected future offered load and presented separately. Its impact is NOT considered in the recommended future projected load values.

Status/Message: Those actions that relate to the use of system resources needed to handle the transfer of information which indicates status change, or provide for equally short message data, of the subscriber or infrastructure. This occurs without producing any specific response either through non-voice means, but contributes to the aggregate communications system channel information transfer rate and load. Status/message traffic may be passed on a working channel or may be passed on a control channel depending upon the specific system implementation. It is anticipated that most if not all Status/Message traffic will be conveyed via packet means.

Activities in each of the three categories contribute to the total user-defined load of a system. The characterization of the traffic load thus must consider certain elements which are:

Number of Transmissions: The number of transmissions per activity. An activity that is completed is a "message." Some number *n* of transmissions would comprise a complete "message". In this case we are not using the term "message" but rather are identifying the number of transmissions required to effect a specified activity. This number of transmissions is referred to as *Tn*.

Duration of Transmissions: In addition to the number of transmissions *Tn*, the duration of the transmission is also a load determining element. Duration of the transmission is defined in seconds and is represented by the term *Td*.

Number of Calls per Average Busy Hour: In addition to the two elements addressed, the third load determining element is the number of transmissions the Public Safety officer is involved in per hour that results in the associated transmissions. This element is expressed by the term *M*.

From this information the offered load, in Erlangs (*E*) can be determined and is calculated by the following expression:

Offered Load in Erlangs = $(Tn \times Td \times M)/3600$.

2. PUBLIC SAFETY OFFICER TRAFFIC PROFILE SUMMARY:

Our data indicate that the busy hour itself is highly variant. Thus, we have elected to recommend that an average busy hour load factor be employed that is approximately four times (4X) as busy as the average non-busy hour. Thus the Average Busy Hour appears to effectively consider routine peak traffic loads. Of course, emergency loading is not considered in this analysis. Typically under emergency conditions, loading may increase by a factor of ten or more.

The summary of offered traffic load per Public Safety officer is as follows:

Present Requirements Summary (Average Busy Hour):

Transaction Type	Inbound Erlangs	Outbound Erlangs
Voice (Digital)	0.0073484	0.0462886
Data	0.0004856	0.0013018
Status/Message	0.0000357	0.0000232

Present Busy Hour Traffic Load Per Officer: 0.0554832

Present Requirements Summary (Average non-Busy Hour "25% of Busy Hour"):

Transaction Type	Inbound Erlangs	Outbound Erlangs
Voice (Digital)	0.0018371	0.0115722
Data	0.0001214	0.0003254
Status/Message	0.0000089	0.0000058

Present Average Hour Traffic Load Per Officer: 0.0138708

Future Requirements Summary (Average Busy Hour):

Transaction Type	Inbound Erlangs	Outbound Erlangs
Voice (Digital)	0.0073284	0.0463105
Data	0.0030201	0.0057000
Status/Message	0.0001540	0.0002223

Future Busy Hour Traffic Load Per Officer: 0.0627354

Future Requirements Summary (Average non-Busy Hour):

Transaction Type	Inbound Erlangs	Outbound Erlangs
Voice (Digital)	0.0018321	0.0115776
Data	0.0007550	0.0014250
Status/Message	0.0000385	0.0000556

Future Average Hour Traffic Load Per Officer: 0.0156838

SPECIAL DATA Future Requirements Summary (Average Busy Hour):

Inbound Erlangs	Outbound Erlangs
0.0268314	0.0266667

Future SPECIAL Data Traffic Load Per Officer: 0.053498

SPECIAL DATA Future Requirements Summary (Average non-Busy Hour):

Inbound Erlangs	Outbound Erlangs
0.0067078	0.0066667

Future SPECIAL Data Traffic Load Per Officer: 0.0133745

What do these data indicate? Firstly, that the use of data in the future will significantly impact system design and use. Secondly, consider the practical translation of the above. If one Erlang is equivalent to 3600 seconds, then in a one hour period a Public Safety officer would use his/her communications equipment (transmit and receive) for the following durations:

Present Busy Hour (0.0554832 Erlangs or 200 seconds)

200 seconds or 3.3 minutes of airtime per officer per busy hour

(If a 5 second average voice transmission is assumed, with a typical message being comprised of three five (5) second transmissions, then 3.3 minutes equates into 13 messages per hour excluding multimedia data usage.)

Present Non-Busy Hour (0.0138708 Erlangs or 50 seconds)

50 seconds per officer of airtime per officer per non-busy hour

(If a 5 second average voice transmission is assumed, with a typical message being comprised of three five (5) second transmissions, then 50 seconds equates into 3.3 messages per hour excluding multimedia data usage.)

Future Busy Hour (0.0627354 Erlangs or 226 seconds)

226 seconds or 3.7 minutes of airtime per officer per busy hour

(If a 5 second average voice transmission is assumed, with a typical message being comprised of three five (5) second transmissions, then seconds equates into 15 messages per hour excluding multimedia usage.)

Future Non-Busy Hour (0.0156838 Erlangs or 56.5 seconds)

56 seconds of airtime per officer per non-busy hour

(If a 5 second average voice transmission is assumed, with a typical message being comprised of three five (5) second transmissions, then 56 seconds equates into 3.7 messages per hour excluding multimedia usage.)

SPECIAL DATA: **Future non-Busy Hour (0.0133745 Erlangs or 48 Seconds)**

SPECIAL DATA: **Future Average Busy Hour (0.053498 Erlangs or 193 Seconds)**

3. GRADE OF SERVICE (GOS), PRIORITY and RESPONSE TIME:

Grade of Service:

We are recommending that the GOS employed for the standard evaluation of Public Safety trunked and conventional system performance be one call for service per one hundred attempts during the average busy hour, is blocked and that the blocked call be held in queue for a period not to exceed five seconds. This results in a GOS being defined as P.01 for the average busy hour.

We are additionally recommending that the Erlang-C traffic equation be employed in determining the Service Grade in conjunction with an assumption that the call arrival rate follows a Poisson distribution.

However, not withstanding this recommendation, it is important to note that today's public safety trunked systems typically operate with a Busy Hour Grade of Service of P.1, meaning that during a busy hour typically 90% of the calls get through with no delay and 10% being delayed for five seconds or less.

What we are recommending is a transition from a GOS of P.1 to P.01. It is our opinion that average busy hour blocking should not impact more than one call per hundred.

Priority:

In addition, we recommend that only two priority types be recognized for baseline comparative purposes: Routine and Emergency.

We suggest that during normal usage ALL Public Safety officers be treated with equal routine operational priority. The only time routine operations priority would be overridden is during an "EMERGENCY". Emergency priority, in our view, results in the ability to "seize" system resources under all circumstances.

Response Time:

In the case of packetized Data and Status/message transmission the notion of GOS is problematic. We believe that Data and Status/message performance is best reflected in terms of a statistically expressed response time. In this regard, we propose that all Data and Status/message messages be received 99% of the time at the following response times assuming a information transport rate of 750 B/s:

SPECIAL DATA	
Large Data Message (30 KBytes)	40,000 ms
NON-SPECIAL DATA	
Moderate Data Message (5 KBytes)	6,666 ms
Small Data Message (2.4 KBytes)	3,200 ms
Status/Message	600 ms

Note: For bearer service, circuit switched data usages, the GOS metric would be applicable as the channel resource is seized until the transaction is completed.

The response times are consistent with a current public safety state-of-common usage technology which has a total payload information transfer rate of approximately 6,000 bits-per-second (b/s) or 750 Bytes-per-second (B/s) including all overhead and turn-around times for half duplex acknowledgment and represent(s) a significant i.e., two fold (2x) improvement in information transfer either in terms of duration (half the time) or content (twice the data) as compared to current 4800 b/s analog systems nominal payload data rates. Compared to those analog systems operating at a 9600 b/s gross rate, the information transport rate of 6,000 b/s (750 B/s) is comparable if not better than that achieved in current analog practice.

4. TRAFFIC MODEL RECOMMENDATION:

Public safety communications traffic loading is typified by large peak-to-mean variations. Typically we have found that average busy hour traffic is at least four (4) times the average non busy hour.

In addition, as stated, it is unacceptable for Public Safety users to be denied service. If system resources are busy, all Public Safety users must be held in queue and assigned a resource as it becomes available. The exception is in an emergency where we recommend that an emergency call seize whatever system resource is needed. This recommendation is discussed further under our coverage on priority usage.

We therefore recommend that the GOS for a Public Safety trunked system be determined through the use of the Erlang-C delay model which is based upon the following predicates:

- The offered load follows a Poisson arrival process
- Service times are exponential
- The load source is infinite
- A FIFO queue is utilized
- A single server queue is employed, calls are directed to the first available server or trunk

- No calls leave the queue
- An infinite queue is available
- Average busy hour to non-busy hour ratio of 4-1

<u>The Poisson traffic equation is expressed as follows:</u>

$$P = e^{-y} \sum_{x=n}^{\infty} (y^x / x!)$$

where:

P = probability of blocking

n = number of trunks or channels

y = traffic offered in Erlangs

<u>The Erlang-C delay model is expressed as follows:</u>

$$w = \frac{t(y)^{n+1} P_o}{y(n-1)!(n-y)^2}$$

where:

$$P_o = \frac{1}{\sum_{x=0}^{n-1} \frac{1}{x!}(y)^x + \frac{1}{n!}(y)^n \left(\frac{n}{n-y}\right)}$$

w = mean wait time in queue in seconds

n = number of trunks or channels

y = Traffic offered in Erlangs

t = mean message duration in seconds which is the reciprocal of the mean message servicing rate

5. IMPACT ON PART 90 LOADING REQUIREMENTS

A word of caution is in order concerning the use of traffic profiles in general: The adoption of any traffic profile for the evaluation of conventional or trunked systems may be in direct conflict with FCC Rules and Regulations. Part 90 specifies conventional and trunked loading as a function of the number of licensed units assigned to a given channel. Thus if 100 units are required per channel, a twenty channel trunked system must have 2000 subscriber sets licensed to it.

We have attempted to present a comparison of our future traffic loading findings and the loading requirements enumerated in Part 90. In this regard, we have assumed a GOS of P.1 (10% blocking) in the average busy hour. Using a baseline 20 channel trunked system that employs one channel for control, we have used the Poisson Traffic table to infer the offered load of 2000 units on 19 trunks (channels) at a GOS of P.1. Nineteen (19) trunks at a P.1 GOS can support 13.65 Erlangs of traffic. Distributed across 2000 units, each unit has an inferred load of approximately .0068 Erlangs.

We believe that in the Public Safety environment, officer safety and mission effective communications demand that sound traffic engineering principles and practices be followed in the design of either a trunked or conventional voice or data or combined system(s). In the United States there is precedent for this in terms of the Part 22 Common Carrier trunked system loading and engineering standards. This recommendation is applicable BOTH to conventional (i.e., non-trunked) and trunked systems.

6. HYPOTHETICAL SYSTEM EXAMPLE OF PROPOSED FUTURE USAGE

Let us consider a hypothetical system that has traffic characterized by our proposed future usage metrics. Let us further assess the performance of the system in context of the P.01 (one call per 100 is blocked) GOS recommendation.

Consider the following configuration:

Number of channels (including control)	20

Number of Trunks	19
Erlangs Supported on 19 trunks	10.35
Recommended GOS	P.01
Future Average Busy Hour Load per user	0.0627354E
Future Average Hour Load per user	0.0156838E

The question then is how many users can the system support using these parameters?

Referring to a traffic table one finds that 19 trunks at a GOS of P.01 can handle 10.35 Erlangs of traffic. Given our assumption that each user generates 0.0627354 Erlangs per hour, a total of (10.35/0.0627354) 165 users can be supported. At a reduced GOS of P.1 (10 out of 100 calls will be blocked), 19 trunks supports 13.65 Erlangs of traffic which supports 218 users. This analysis reveals an apparent inconsistency with Part 90 which requires that 20 channels (irrespective of control channel usage) have 2000 licensed users.

The values are depicted in the following table:

FUTURE USAGE (AVERAGE BUSY HOUR)

GOS	#Units Supported	Assumed Offered Load/Unit	Airtime Per Unit Per Hour
P.01	165	0.0627354	226 Seconds (3.8 Min.)
P.1	218	0.0627354	226 Seconds (3.8 Min.)

In the case of Average Hour (NONBUSY) the number of units supported are as follows:

FUTURE USAGE (AVERAGE HOUR)

GOS	#Units Supported	Assumed Offered Load/Unit	Airtime Per Unit Per Hour
P.01	660	0.0156838	56 Seconds
P.1	870	0.0156838	56 Seconds

As one can see these values are less than the loading prescribed in Part 90 assuming that the quantity of licensed units and units actually in service at a given point-in-time, are the same. The following table summarizes the Part 90 offered load for both P.01 and P.1 GOS, during the Average BUSY Hour:

FCC PART 90 LOADING
(Hypothetical 20 Channel Trunked System)

GOS	#Units Supported	Assumed Offered Load/Unit	Airtime/Unit/Hour
P.01	2000	0.0052 E	18.7 Seconds
P.1	2000	0.0068 E	24.5 Seconds

Thus, the Part 90 inferred offered load appears to be significantly less than our present day busy-hour and projected future non-busy and busy hour metrics.

In an attempt to evaluate the Part 90 inferred offered load of 0.0068E or 24.5 seconds with our projected average busy hour offered load metric of 0.0138708E or 50 seconds, we looked for obvious areas of usage that did not exist with the Part 90 standards were developed. We focused on three areas: Tactical Voice, Data and Status:

If we back-out the contribution of Tactical VOICE, DATA and STATUS from our future projected offered load metrics we see that the 0.0138708E offered load reduces by (0.010416675E tactical VOICE, 0.00032545E extracting the DATA, and by 0.0000058E extracting the STATUS for a total reduction in offered load of 0.010747925E) resulting in an adjusted voice only system load of 0.003122875E (11.24 seconds). This value is much less than the Part 90 inferred value of .0068E (24.5 Seconds) based upon "current" non-busy hour usage.

However, during a present day busy hour, the traffic increased by a factor of four (4) resulting in a corrected load of 0.0124915E (45 Seconds) (excluding the tactical voice, data and status messages).

In the future, the situation appears to be more complicated where both non-busy and busy hour loads are anticipated to be significantly greater characterized by extensive combined digital voice, data and status traffic. In addition, the tactical voice modality is a current reality which is likely to proliferate in the future.

Notwithstanding these facts, one may conclude that the loading values established in Part 90 based upon a non-busy hour GOS of P.1 (10% blocking) was reasonable when considering traditional dispatch voice traffic during the non-busy hour.

It is important to keep in mind the fact that although examples provided are illustrative of trunked systems, the same issues face designers, operators and users of conventional or composite conventional systems. Each trunk (functional channel) can support only a certain traffic load for a prescribed grade-of-service. Proper system engineering demands that user loading be considered in all types of systems (trunked, composite conventional, conventional) and for all types of usage (digital voice, data and status).

7. NOTES TO PROPOSED TRAFFIC PROFILE METRICS

The following are notes applicable to the traffic profile metrics attached to this document as Appendix A:

Note 1:
These values represent an amalgamation of state, local, federal, and international data. In those areas where no information different from the initial Ericsson proposal was available, the Ericsson data remain.

Future projections were based upon logical extrapolations of current usage.

Note 2:
These values are representative of an amalgamation of state, local, federal, and international data. In those areas where no information different from the initial Ericsson proposal was available, the Ericsson data remain.

Future projections were based upon logical extrapolations of current usages. Certain new services considered NCIC-2000 type technologies and large file size multimedia, information transfer rate intensive technologies.

Note 3:

The emerging use of SPECIAL DATA presents major concern, as seen above, SPECIAL DATA will likely increase the offered load by 48 seconds per user in the average hour and by 193 seconds in the busy hour. Clearly these increases in offered load are NOT supportable by currently deployed technology.

As technological advancements occur in compression methodologies that permit large data messages and slow scan imagery to be transmitted in shorter times, the impact on system loading will be dramatically decreased. However, it is important to note that new technologies such as the wireless transmission of telephoto (mug shot), fingerprint and imagery, employing today's compression techniques, will require significant transmission times. If user operational requirements PROJECT significant usage of these large data files sharing with tactical voice may result in unacceptably long delays.

We recommend that SPECIAL DATA be transported by means of technologies and systems specifically engineered to handle its information transfer rate intensive nature in a fashion that provides response time equivalency to today's status, message and database query usages. This is because operational users have certain expectations as to how long data queries should take. To foster user acceptance and to constrain system loading, we assert multimedia transmission and transport times should be comparable to those of current data usages. Thus, information transfer rates in the high kb/s to low Mb/s range will likely be required depending upon the compressed file size in order to provide response times comparable to current status message data usage.

APPENDIX A

Aggregated Public Safety Communications User

TRAFFIC PROFILES

25 MAY 1995
(reprinted 13 March 1996)

PUBLIC SAFETY OFFICER AVERAGE BUSY HOUR TRAFFIC PROFILE PRESENT REQUIREMENTS SUMMARY	Inbound Erlangs	Outbound Erlangs
VOICE	0.0073484	0.0462886
DATA	0.0004856	0.0013018
STATUS	0.0000357	0.0000232
Resulting Subscriber Busy Hour Traffic Loading	0.0078696	0.0476136
	TOTAL	0.0554832

PUBLIC SAFETY OFFICER AVERAGE BUSY HOUR TRAFFIC PROFILE FUTURE REQUIREMENTS SUMMARY	Inbound Erlangs	Outbound Erlangs
VOICE	0.0073284	0.0463105
DATA	0.0030201	0.0057000
STATUS	0.0001540	0.0002223
Resulting Subscriber Busy Hour Traffic Loading	0.0105026	0.0522328
	TOTAL	0.0627354

PUBLIC SAFETY OFFICER AVERAGE HOUR TRAFFIC PROFILE PRESENT REQUIREMENTS SUMMARY	Inbound Erlangs	Outbound Erlangs
VOICE	0.0018371	0.0115722
DATA	0.0001214	0.0003254
STATUS	0.0000089	0.0000058
Resulting Subscriber Average Hour Traffic Loading	0.0019674	0.0119034
	TOTAL	0.0138708

PUBLIC SAFETY OFFICER AVERAGE HOUR TRAFFIC PROFILE FUTURE REQUIREMENTS SUMMARY	Inbound Erlangs	Outbound Erlangs
VOICE	0.0018321	0.0115776
DATA	0.0007550	0.0014250
STATUS	0.0000385	0.0000556
Resulting Subscriber Average Hour Traffic Loading	0.0026256	0.0130582
	TOTAL	0.0156838

PUBLIC SAFETY OFFICER AVERAGE BUSY HOUR TRAFFIC PROFILE FUTURE REQUIREMENTS SUMMARY (SPECIAL DATA)	Inbound Erlangs	Outbound Erlangs
SPECIAL DATA	0.0268314	0.0266667
Resulting Subscriber Busy Hour Traffic Loading	0.0268314	0.0266667
	TOTAL	0.053498

PUBLIC SAFETY OFFICER AVERAGE HOUR TRAFFIC PROFILE FUTURE REQUIREMENTS SUMMARY (SPECIAL DATA)	Inbound Erlangs	Outbound Erlangs
SPECIAL DATA	0.0067078	0.0066667
Resulting Subscriber Busy Hour Traffic Loading	0.0067078	0.0066667
	TOTAL	0.0133745

Public Safety Officer Busy Hour Traffic Profile FUTURE REQUIREMENTS									
TELESERVICES	**OPERATIONS**	**Traffic Channel Loading**							
		INBOUND				OUTBOUND			
		Tn	Td	M	OFFERED LOAD (erlangs)	Tn	Td	M	OFFERED LOAD (erlangs)
VOICE (Note 1)									
Group	Special Info/Assign	2	2.00	1.260	0.0014000	2	2.00	1.385	0.0015385
	Medical Detail	2	2.00	0.009	0.0000104	2	2.00	0.009	0.0000104
	Bomb/Explosive Alert	2	2.00	0.009	0.0000104	2	2.00	0.009	0.0000104
	Conduct Investigation	2	2.00	0.210	0.0002333	2	2.00	0.231	0.0002564
Individual	Special Info/Assign	2	4.80	0.840	0.0022400	2	2.50	0.923	0.0012821
	Medical Detail	2	2.50	0.019	0.0000259	2	1.25	0.021	0.0000142
	Conduct Investigation	2	4.80	0.105	0.0002800	2	2.50	0.115	0.0001603
	Traffic Report	2	2.50	0.210	0.0002917	2	1.25	0.210	0.0001458
	Bomb/Explosive Alert	2	2.50	0.005	0.0000065	2	1.25	0.005	0.0000032
	Emergency	2	2.50	0.009	0.0000130	2	1.25	0.009	0.0000065
	Vehicle Report	2	6.00	0.525	0.0017500	2	2.50	0.525	0.0007292
	Persons Report	2	6.00	0.315	0.0010500	2	2.50	0.315	0.0004375
Broadcast	Special Info/Assign	1	3.00	0.009	0.0000078	1	6.00	0.009	0.0000156
	Emergency	1	3.00	0.004	0.0000029	1	6.00	0.004	0.0000058
	Bomb/Explosive Alert	1	3.00	0.005	0.0000039	1	1.00	0.005	0.0000013
Hazardous Material		2	2.00	0.0004	4.44E-07	2	2.00	0.004	0.0000044
EMS Control and General	Public Safety Reports	2	10.00	0.0004	2.22E-06	2	10.00	0.004	0.0000222
PSTN	Special Info/Assign	2	10.00	0.0000100	0.0000001	2	12.00	0.0000100	0.0000001
Unit-to-Unit	Tactical	0	0.00	0.000	0	3	20.00	2.500	0.041667
Total Contributions		33	70.60	3.535	0.0073284	36	80.00	6.283	0.0463105

DATA (Note 2)									
Hazardous Material		1	1.00	0.004	0.0000011	1	1.00	0.004	0.0000011
EMS Control and General	Public Safety Reports	1	5.00	0.004	0.0000056	1	5.00	0.004	0.0000056
	Missing	1	0.80	0.068	0.0000150	1	2.40	0.068	0.0000450
	Unidentified	1	0.80	0.270	0.0000600	2	2.40	0.270	0.0003600
Stolen Articles	License Plate	1	0.80	0.135	0.0000300	2	2.40	0.135	0.0001800
	Serial Number	1	0.80	0.036	0.0000081	2	2.40	0.036	0.0000486
	Identification Number	1	0.80	0.090	0.0000201	1	2.40	0.090	0.0000603
Alarm Compliance	Burglary	1	0.80	0.036	0.0000081	1	2.40	0.036	0.0000243
	Ringing	1	0.80	0.018	0.0000039	1	2.40	0.018	0.0000117
	Vandalism	1	0.80	0.068	0.0000150	1	2.40	0.068	0.0000450
	Robbery	1	0.80	0.068	0.0000150	1	2.40	0.068	0.0000450
For Information (FI)	Suspicious Persons	1	2.40	4.000	0.0026667	1	4.00	4.000	0.0044444
Addr/Tel Info (ATI)	Suspicious Persons	1	1.60	0.386	0.0001716	1	4.00	0.386	0.0004290
Voiceless Dispatch	(see voice)								
Total Contributions		13	17.20	5.183	0.0030201	16	35.60	5.183	0.0057000

STATUS	Special Info/Enroutes	1	0.03	6.000	0.0000500	1	0.03	3.000	0.0000250
	Network Management	1	0.80	0.420	0.0000933	1	1.60	0.420	0.0001867
SYSTEM CONTROL									
Security	Registration								
	Authentication	1	1.03	0.009	0.0000027	1	1.03	0.009	0.0000027
	Corroboration	1	3.09	0.009	0.0000080	1	3.09	0.009	0.0000080
Total Contributions		4	4.95	6.439	0.0001540	4	5.75	3.439	0.0002223

TELESERVICES SPECIAL DATA	OPERATIONS	INBOUND				OUTBOUND			
		Tn	Td	M	OFFERED LOAD (erlangs)	Tn	Td	M	OFFERED LOAD (erlangs)
Slow Scan		1	100.00	0.060	0.001667	1	100.00	0.060	0.0016667
Images	Mugshot	1	30.0	1.000	0.0083333	1	30.0	1.000	0.0083333
	Fingerprint	1	30.0	1.000	0.0083333	1	30.0	1.000	0.0083333
	Object ID	1	30.0	1.000	0.0083333	1	30.0	1.000	0.0083333
Total Contributions		4	190.00	3.060	0.0268314	4	190.00	3.060	0.0266667

Public Safety Officer
Busy Hour Traffic Profile
PRESENT REQUIREMENTS

TELESERVICES	OPERATIONS	Traffic Channel Loading INBOUND Tn	Td	M	OFFERED LOAD (erlangs)	OUTBOUND Tn	Td	M	OFFERED LOAD (erlangs)
VOICE (Note 1)									
Group	Special Info/Assign	2	2.00	1.260	0.0014000	2	2.00	1.385	0.0015385
	Medical Detail	2	2.00	0.009	0.0000104	2	2.00	0.009	0.0000104
	Bomb/Explosive Alert	2	2.00	0.009	0.0000104	2	2.00	0.009	0.0000104
	Conduct Investigation	2	2.00	0.210	0.0002333	2	2.00	0.231	0.0002564
Individual	Special Info/Assign	2	4.80	0.840	0.0022400	2	2.50	0.923	0.0012821
	Medical Detail	2	2.50	0.019	0.0000259	2	1.25	0.021	0.0000142
	Conduct Investigation	2	4.80	0.105	0.0002800	2	2.50	0.115	0.0001603
	Traffic Report	2	2.50	0.210	0.0002917	2	1.25	0.210	0.0001458
	Bomb/Explosive Alert	2	2.50	0.005	0.0000065	2	1.25	0.005	0.0000032
	Emergency	2	2.50	0.009	0.0000130	2	1.25	0.009	0.0000065
	Vehicle Report	2	6.00	0.525	0.0017500	2	2.50	0.525	0.0007292
	Persons Report	2	6.00	0.315	0.0010500	2	2.50	0.315	0.0004375
Broadcast	Special Info/Assign	1	3.00	0.009	0.0000078	1	1.00	0.009	0.0000026
	Emergency	1	3.00	0.004	0.0000029	1	1.00	0.004	0.0000010
	Bomb/Explosive Alert	1	3.00	0.005	0.0000039	1	1.00	0.005	0.0000013
Hazardous Material		2	2.00	0.0004	4.444E-07	2	2.00	0.0004	4.444E-07
S Control and General	Public Safety Reports	2	10.00	0.004	2.222E-05	2	10.00	0.004	2.222E-05
PSTN	Special Info/Assign	2	7.20	0.0000100	0.0000000	1	7.20	0.0000100	0.0000000
Unit-to-Unit	Tactical	0	0.00	0.000	0	3	20.00	2.500	0.0416667
Total Contributions		33	67.80	3.538	0.0073484	35	65.20	6.279	0.0462886